Applicant: John C. Batterton et al.

Attorney's Docket No.: 09991-151001

Serial No.: 10/748,833

Filed: December 30, 2003

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Amendments to the claims (this listing replaces all prior versions):

1. (currently amended) A drop ejector, comprising:

a flow path in which fluid is pressurized to eject drops from a nozzle opening, the nozzle having an inlet and an outlet, and the outlet being formed in a substantially planar substrate and lying in a plane defined by a surface of the substrate;

a radial channel formed in the substrate proximate the nozzle opening on the same surface as the outlet, the radial channel having dimensions configured to and being spaced from the nozzle opening outlet a distance to draw fluid into the space defined by the radial channel, a portion of the radial channel being below the plane defined by the surface of the substrate; and

at least one connecting channel formed in the substrate and extending from the radial channel, the connecting channel being configured to move fluid away from the nozzle opening outlet.

2. (currently amended) A drop ejector, comprising:

first and second flow paths in which fluid is pressurized to eject drops from first and second nozzles, the nozzles each having an inlet and an outlet, and the outlet being formed in a substantially planar substrate and lying in a plane defined by a surface of the substrate;

first and second radial channels formed in the substrate proximate the respective first and second nozzle openings on the same surface as the outlets, the radial channels having dimensions and being spaced from the nozzle openings outlets a distance configured to draw fluid into the space defined by the radial channels, a portion of the radial channels being below the plane defined by the surface of the substrate; and

first and second connecting channels formed in the substrate and extending from the first and second radial channels, and a third connecting channel connecting the first and second radial channels, the connecting channels being configured to move fluid away from the nozzle opening outlet.

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3. (currently amended) The drop ejector of claim 2 wherein the first and second channels

[[is]]are in the shape of a circle.

4. (canceled)

5. (currently amended) The drop ejector of claim 1 wherein the radial channel has a width

that is about twice the nozzle opening outlet width or less.

6. (previously presented) The drop ejector of claim 1 wherein the radial channel has a width

of about 100 microns or less.

7. (previously presented) The drop ejector of claim 1 wherein a depth of the radial channel

is from about 2 micron to about 50 micron.

8. (previously presented) The drop ejector of claim 1 wherein the substrate is a silicon

material.

9. (currently amended) The drop ejector of claim 1 wherein the planar substrate includes a

plurality of nozzles openings and radial channels proximate the nozzles openings.

10. (currently amended) The drop ejector of claim 1 wherein the nozzle opening outlet width

is about 200 micron or less.

11. (original) The drop ejector of claim 1 including a piezoelectric actuator.

12. (currently amended) A method of fluid ejection, comprising:

ejecting a drop through a nozzle opening having an inlet and an outlet formed in a

substrate and lying in a plane defined by a surface of the substrate;

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positioning a radial channel in the substrate proximate the nozzle opening on the same surface as the outlet;

providing at least one connecting channel in the substrate, the connecting channel extending from the radial channel;

drawing fluid into the radial channel during fluid ejection, the fluid moving from the radial channel into the connecting channel, a portion of the radial channel being below the plane defined by the surface of the substrate.

- 13. (original) The method of claim 12 wherein the fluid has a surface tension of about 20-50 dynes/cm.
- 14. (original) The method of claim 12 wherein the fluid has a viscosity of about 1 to 40 centipoise.
- 15. (currently amended) The drop ejector of claim 1 wherein the radial channel is spaced from the nozzle opening outlet by a distance of about 20% of an outlet nozzle width or more.
- 16. (canceled)
- 17. (previously presented) The drop ejector of claim 1 further comprising a vacuum source in communication with the connecting channel.
- 18. (previously presented) The drop ejector of claim 1 further comprising a wicking material in communication with the connecting channel.
- 19. (previously presented) The drop ejector of claim 1 wherein fluid is drawn into the space defined by the radial channel during jetting.

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20. (currently amended) The method of claim 12 wherein the radial channel is spaced from the nozzle opening outlet by a distance of about 20% of an outlet nozzle width or more.

- 21. (canceled)
- 22. (previously presented) The method of claim 12 further comprising providing a vacuum source in communication the connecting channel.
- 23. (previously presented) The method of claim 12 further comprising providing a wicking material in communication with the connecting channel.
- 24. (previously presented) The method of claim 12 wherein the fluid is drawn into the radial channel by capillary forces.
- 25. (previously presented) The method of claim 12 wherein the fluid is drawn into the radial channel by gravity.
- 26. (previously presented) The method of claim 12 wherein fluid is drawn into the space defined by the radial channel during jetting.